



IRISH CATTLE BREEDING FEDERATION

Genomics Evaluation Update



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Genomics Update

- Introduced genomics in Feb 2009
- Two-step evaluation – first calculate traditional EBV, blended with genomic information
- 5300 bulls currently in the reference population
- Only animals with majority Ho/Fr eligible for genomic evaluations
- Holy grail – one step multi-breed genomic evaluation for all animals (genotyped and non-genotyped)

Results

- Average PTA (reliabilities in brackets) N=244

| | Official | Daughter | PA |
|--------|-----------|-----------|------------|
| Milk | 133 (63) | 129 (94) | 197 (41) |
| Fat | 11.2 | 11 | 13 |
| Fat % | 0.119 | 0.12 | 0.106 |
| Prot | 8.5 | 8.2 | 10.5 |
| Prot % | 0.08 | 0.078 | 0.074 |
| CI | -4.2 (49) | -5.1 (81) | -3.48 (31) |
| SU | 2.2 | 1.99 | 1.9 |
| CD | 1.9 (50) | 2.7 (90) | 3.05 (37) |
| Gest | -2.35 | -2.73 | -2.0 |

Results

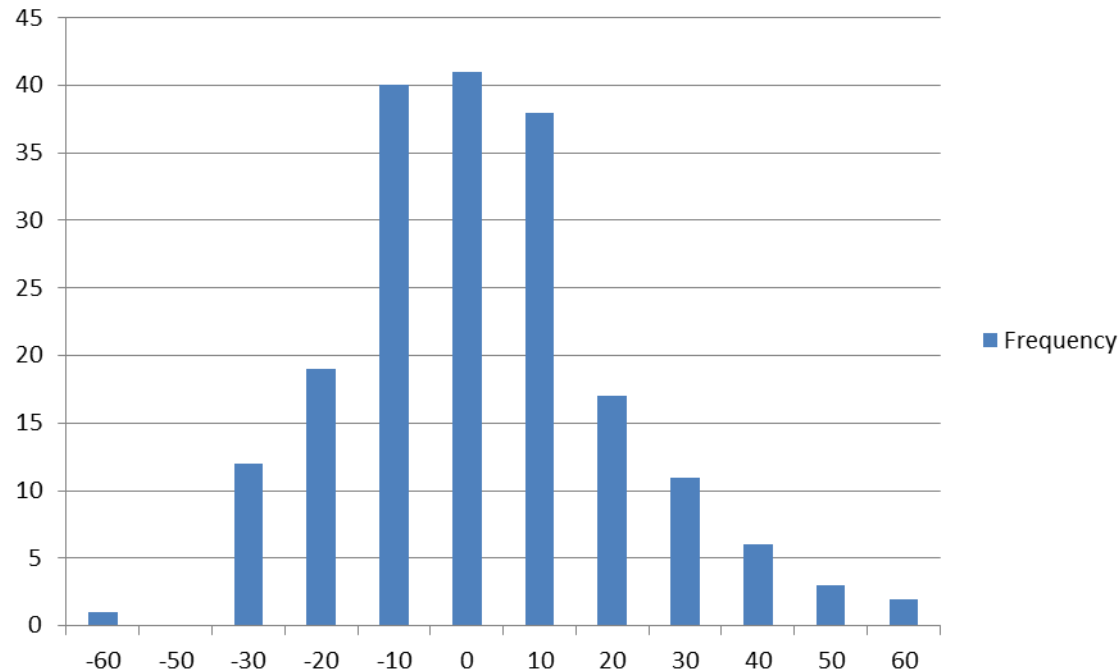
- Correlations to proven proofs

| Correlation with DP | Official | PA |
|---------------------|----------|------|
| Milk | 0.75 | 0.67 |
| Fat | 0.68 | 0.48 |
| Fat % | 0.81 | 0.73 |
| Prot | 0.68 | 0.53 |
| Prot % | 0.75 | 0.64 |
| CI | 0.77 | 0.65 |
| SU | 0.64 | 0.49 |
| CD | 0.44 | 0.36 |
| Gest | 0.6 | 0.5 |

Results

- Expected difference among bulls – average MSI -€3

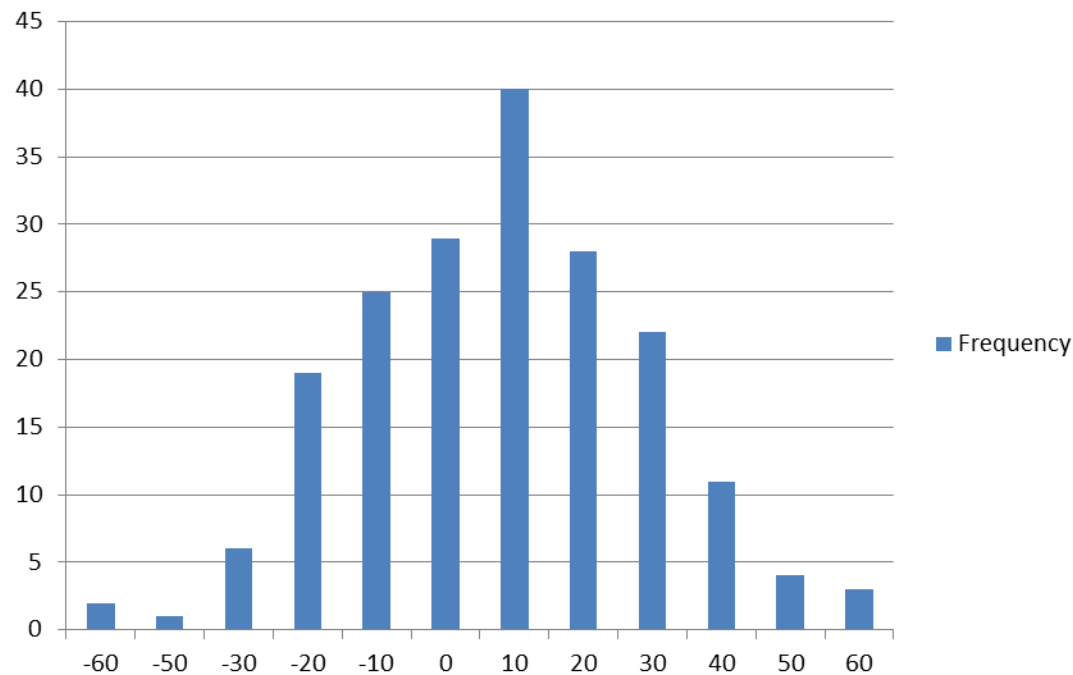
Distribution of Differences - MSI



Results

- Expected difference among bulls – average diff FSI of €12 (daughter proof is greater than genomic proof)

Distribution of Differences - FSI



Challenges

- Software no longer capable of handling increased numbers of genotyped animals in reference population
- Currently 85,000 dairy animals genotyped => multiple runs at main evaluations which takes time
- Beef and calving evaluations were produced in a multi trait evaluation for both dairy and beef => likely switching to genomic evaluations for beef
- Cow genotypes need to be utilised in the evaluation

Research to date

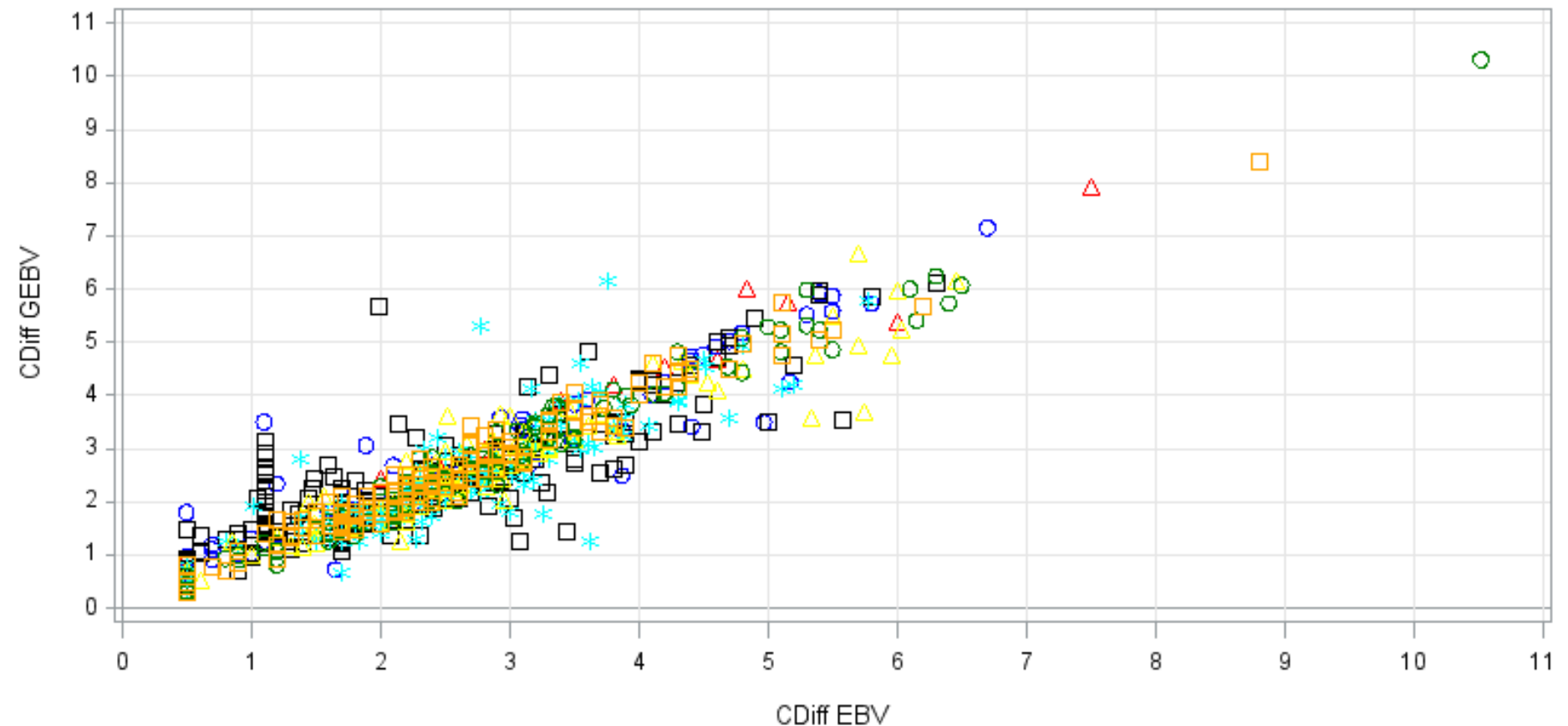
- One-step evaluations currently not implemented anywhere in the world
- Lots of work currently done on two-step evaluations for 500k animals as part of the beef genomics work
- Looking to utilise this work to generate genomic evaluations using an increased reference population
- Possibility to produce across breed genomic evaluations

Calving Difficulty Comparison: GEBV vs EBV

No of bulls 890 correlation $r = 0.924$

EBV mean = 2.59 {stdev = 1.3}

GEBV mean = 2.56 {stdev = 1.27}

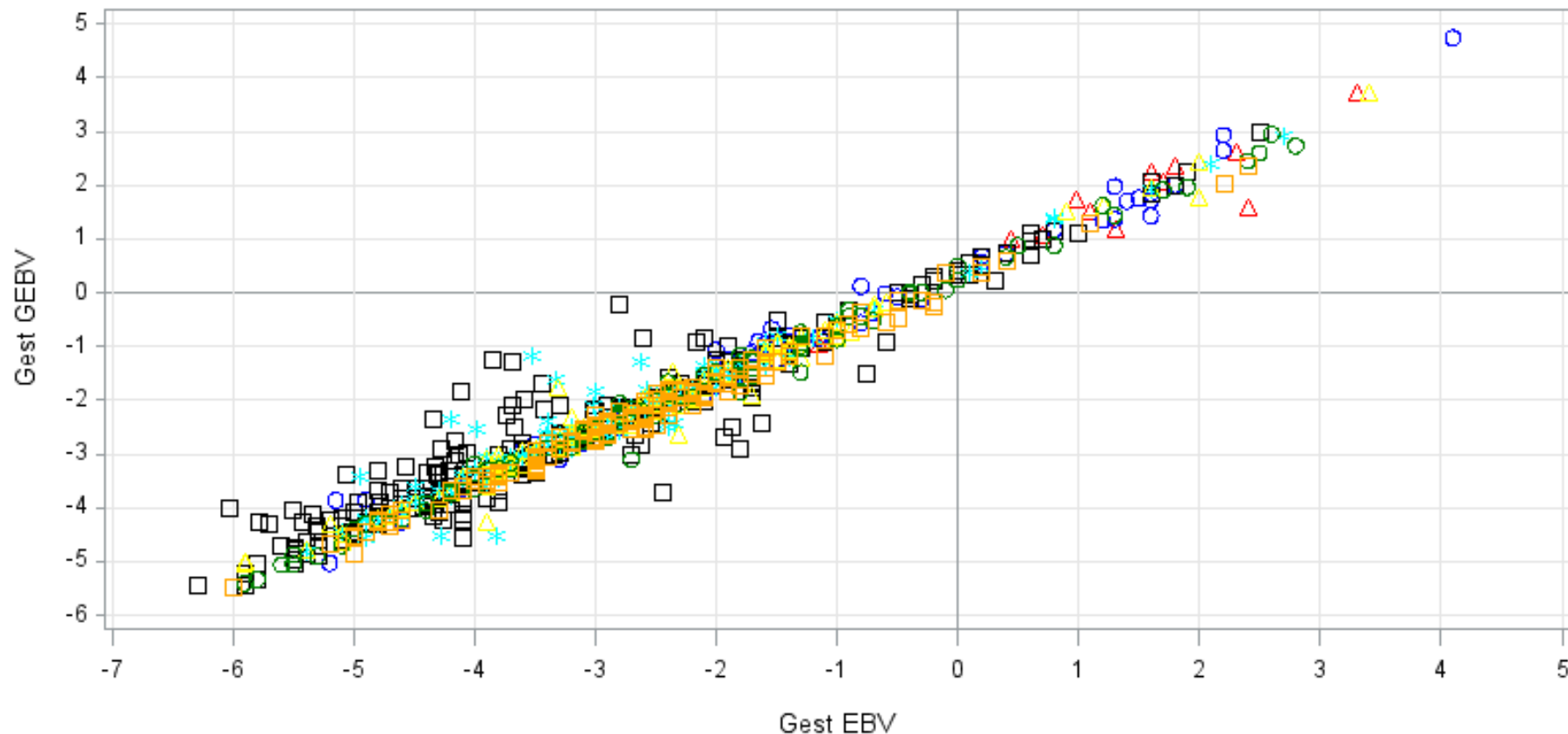


Gestation Length Comparison: GEBV vs EBV

No of bulls 890 correlation $r = 0.98$

EBV mean = -2.63 {stdev = 1.76}

GEBV mean = -2.16 {stdev = 1.67}

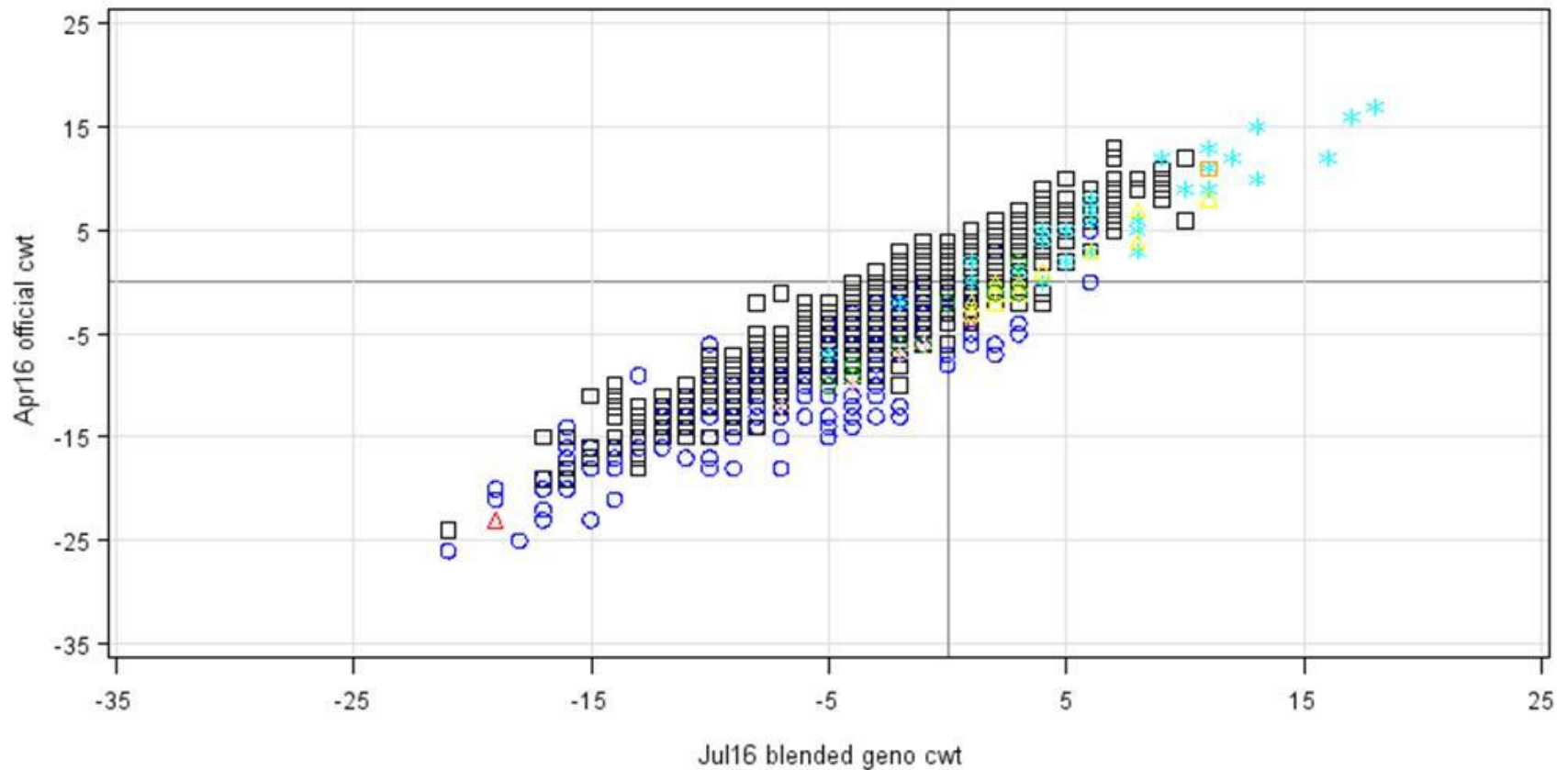


Reliabilities – bulls 40-80% rel (n=300)

| Variable | Mean | Increase % |
|-----------------|-------------|-------------------|
| Cdiff_rel_new | 76.33 | |
| CD_Rel | 74.59 | 1.74 |
| Gest_rel_new | 84.53 | |
| Gest_Rel | 80.61 | 3.91 |
| Mort_rel_new | 69.40 | |
| Mort_Rel | 63.57 | 5.83 |
| Mat_cd_rel_new | 41.20 | |
| MCDRel | 36.44 | 4.76 |

Carcass weight: official versus blended geno: AI sires 70 rel

No of animals 1775 correlation $r = 0.925$
Apr16 official cwt = -2.67 {stdev = 6.07}
Jul16 blended geno cwt = -2.34 {stdev = 5}



Milk & Fertility

- Direct genomic values calculated for Milk, fat, protein, CI and SU (20k reference population)
- 90% reliability bulls

| DGV | Mean | Correlation |
|---------------------|-------------|--------------------|
| New Milk | 135.4 | 0.998 |
| Current Milk | 131.2 | |
| New Fat | 9.4 | 0.997 |
| Current Fat | 9.5 | |
| New Prot | 7.6 | 0.998 |
| Current Prot | 7.5 | |
| New CIV | -4.1 | 0.93 |
| Current CIV | -4.2 | |
| New SU | 1.8 | 0.94 |
| Current CIV | 1.9 | |

Next Steps

Calving & Beef Traits

- Preference would be to make Calving and Beef proofs official for August run

Other traits

- Blending of the DGV & traditional EBVs
- Validation & checking
- Test proofs for feedback